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MODIFYING ONLY SELECTED ICONS ON AN INTERACTIVE DISPLAY SCREEN CROWDED WITH ICONS BY RENDERING THE NON-SELECTED ICONS UNMODIFIABLE

Technical Field

5   The present invention relates to user interactive computer supported display technology and particularly to such user interactive systems and methods that are user friendly and provide computer users with an interface environment that is easy to use, even in displays which
10   are crowded and cluttered with icons.

Background of Related Art

The past decade has been marked by a technological revolution driven by the convergence of the data processing industry with the consumer electronics
15   industry. This advance has been even further accelerated by the extensive consumer and business involvement in the Internet or World Wide Web ("Web") over the past several years. As a result of these changes, it seems as if virtually all aspects of human endeavor in the
20   industrialized world require human-computer interfaces. These changes have made computer directed activities accessible to a substantial portion of the industrial world's population, which, up to a few years ago, was computer-illiterate, or, at best, computer indifferent.
25   In order for the vast computer supported industries and market places to continue to thrive, it will be necessary for increasing numbers of workers and consumers who are limited in computer skills to become involved with computer interfaces.
30   Despite all of the great changes that have been made in the computer industry, the screen cursor controlled

manually by the user still remains the primary human-
computer interface. The user still commands the computer
primarily through manual pointing devices such as mice,
joy sticks and trackballs which control the on-screen
5   cursor movements. It must be noted that the principles
involved in such pointing devices were developed over a
generation ago when most of the people involved in
interfaces to computers were computer professionals who
were willing to invest great amounts of time in
10   developing computer skills. It is very possible that had
computers originally been the mass consumer, business and
industry implements that they are today, user interfaces
that were much easier and required less skill to use
would have been originally sought and developed.
15   Nonetheless, the manually controlled cursor movement
devices are our primary access for cursor control. The
present invention is directed to making mouse, trackball
and the like cursor control devices more user friendly
and effective.
20   Icons in Graphical User Interfaces (GUIs) are, of
course, the primary access through which the user may
interactively select substantially all computer functions
and data. Thus, the number of icons that the user has to
contend with in the navigation of his cursor to his
25   target icon has been greatly increasing. These may be
arranged in many layers of windows. In certain portions
of the user's display screen, there may be dense
populations of icons. The icons may overlap or be
stacked one on the other.
30   In addition, the user's desktop display screens have
been increasing in size to thereby provide the user with
the luxury of some room for icon spacing to visually
separate icons. On the other hand, users are extensively

using laptop computers, palm-type devices (including
Personal Digital Assistants (PDAs)) and even cell phone
displays to supplement their desktops. Thus, the desktop
displays need to be replicated on these smaller screen
5   devices to thereby make the icons even more closely
spaced.

    As significant as problems may be in locating icons
and like items in GUI displays, there are even more
difficult problems involved in trying to modify such
10   icons or like GUI items in high icon density sections of
the display screen. In GUIs it is commonplace for the
user to be provided with the facility to modify or
otherwise manipulate items such as icons. Such
modifications include enlarging or shrinking icon sizes,
15   moving, grouping or ungrouping icons. However, because
of the closeness of the surrounding icons, even the
simplest of such icon modifications or manipulations
becomes quite difficult. Even a skilled cursor user may
be attempting to delicately manipulate one object but
20   inadvertently perform an unwanted modification on an
object close to the desired object. The user may be
attempting to move an object or icon but catch the wrong
side of an adjacent object and inadvertently change its
size. It is even possible in all of the clutter and
25   potential confusion to end up performing an unintended
function on the user's desired or target icon; e.g. the
user intends to point the cursor at one side of the
object so as to move the object but inadvertently points
to the other side of the object which causes the object
30   to commence enlarging.

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Summary of the Present Invention

The present invention offers a solution for modifying items such as icons in high icon density environments on the display screen. The invention 5 provides the combination of means for rendering a set of these items unmodifiable, and means for enabling the modifying of a selected item in said set of unmodifiable items. In effect, all of the icons in the high icon density region or sector of the display screen are 10 "frozen" so as to be unmodifiable, and then only a selected or "target" icon is made modifiable or "hot" while the other icons in the sector remain unmodifiable. The rendering of the target icon to be modifiable may involve a simple point and click cursor movement which 15 still is not an easy task in a crowded icon environment. However, once this is accomplished, then the rest of the icon modification is simplified in that the adjacent icons remain frozen in the unmodifiable state. According to an aspect of the invention, the rendering of the set 20 of a cluster of icons unmodifiable includes circumscribing said cluster of icons, preferably using the cursor.

Brief Description of the Drawings

The present invention will be better understood and 25 its numerous objects and advantages will become more apparent to those skilled in the art by reference to the following drawings, in conjunction with the accompanying specification, in which:

Fig. 1 is a block diagram of a generalized data 30 processing system including a central processing unit

that provides the computer controlled interactive display
system which may be used in practicing the present
invention;

Fig. 2 is a diagrammatic view of a display screen
5   illustrating an example of high density number of icons
environment crowded with clusters of icons to which the
present invention is applicable;

Fig. 3 is the diagrammatic display view of Fig. 2
but illustrating the action of the cursor in
10   circumscribing a set or high density sector of icons for
rendering these icons unmodifiable;

Fig. 4 is a magnified view of the circumscribed
sector of unmodifiable icons of Fig. 3;

Fig. 5 is the view of Fig. 4 after the cursor has
15   pointed to and selected a "hot" icon to thereby render
the selected icon modifiable;

Fig. 6 is a portion of the view of Fig. 5 magnified
even further to illustrate the selected modifiable or
"hot" icon;

20   Fig. 7 is the view of Fig. 6 after the "hot" icon
has been modified to enlarge the icon;

Fig. 8 is the view of Fig. 6 after the "hot" icon
has been modified to move the icon;

Fig. 9 is a magnified view of a section of a display
25   screen illustrating a high icon density environment
wherein the icons are of different types illustrated by
their different shapes;

Fig. 10 is a view of a display dialog box which may
be used to freeze all of the icons in the high density
30   sector of Fig. 9 and to then inhibit the freezing of
icons of one shape type;

Fig. 11 is a flowchart of the program steps involved
in setting up a process for freezing the modification of

icons in a particular sector of a display screen and then
unfreezing selected icons; and

Fig. 12 is a flowchart of the steps involved in an
illustrative run of the process set up in Fig. 11.

5   Detailed Description of the Preferred Embodiment

Referring to Fig. 1, a typical data processing
system is shown that may function as the computer
controlled display terminal used in implementing the
system of the present invention of freezing the
10   modification of icons in a particular sector of a display
screen and then unfreezing selected icons. A central
processing unit (CPU) 10, such as any PC microprocessor
in a PC available from International Business Machines
Corporation (IBM) or Dell Corp., is provided and
15   interconnected to various other components by system bus
12. An operating system 41 runs on CPU 10, provides
control and is used to coordinate the function of the
various components of Fig. 1. Operating system 41 may be
one of the commercially available operating systems such
20   as Microsoft's Windows98™ or WindowsNT™, as well as the
UNIX or IBM's AIX operating systems. An application
program for providing for the freezing of the
modification of icons in a particular sector of a display
screen and then unfreezing selected icons within the
25   frozen sector so that such icons may be modified to be
subsequently described in detail, runs in conjunction
with operating system 41 and provides output calls to the
operating system 41, which, in turn, implements the
various functions to be performed by the application 40.
30   A Read Only Memory (ROM) 16 is connected to CPU 10 via
bus 12 and includes the Basic Input/Output System (BIOS)
that controls the basic computer functions. Random

Access Memory (RAM) 14, I/O adapter 18 and communications
adapter 34 are also interconnected to system bus 12. It
should be noted that software components, including
operating system 41 and application 40, are loaded into
5   RAM 14, which is the computer system's main memory. I/O
adapter 18 may be a Small Computer System Interface
(SCSI) adapter that communicates with the disk storage
device 20, i.e. a hard drive. Communications adapter 34
interconnects bus 12 with an outside network enabling the
10   data processing system to communicate with other such
systems over a Local Area Network (LAN) or Wide Area
Network (WAN), which includes, of course, the Internet.
I/O devices are also connected to system bus 12 via user
interface adapter 22 and display adapter 36. Keyboard 24
15   and mouse 26 are all interconnected to bus 12 through
user interface adapter 22. Mouse 26 operates in a
conventional manner insofar as user movement is
concerned. Display adapter 36 includes a frame buffer
39, which is a storage device that holds a representation
20   of each pixel on the display screen 38. Images may be
stored in frame buffer 39 for display on monitor 38
through various components such as a digital to analog
converter (not shown) and the like. By using the
aforementioned mouse or related devices, a user is
25   capable of inputting information to the system through
the keyboard 24 or mouse 26 and receiving output
information from the system via display 38.

   With reference to Fig. 2, the display screen 52
shown has a great number of icons 51 (simplified to just
30   squares for illustration). Actually the number of icons
has also been minimized for this example. It is
understood that there may be icons arranged in patterns
of greater or lesser icon density, i.e. greater spacing

between icons. Screen sector 50 is illustrative of a
high icon density area. Thus, when the cursor 53 is to
be used in a conventional manner to move, enlarge or
otherwise modify a selected or target icon, it may be

5   seen that in a high density sector other adjacent icons
around the target icon may be inadvertently changed. In
accordance with the present invention as shown in Fig. 3,
cursor 53 is moved along path 54 to circumscribe all of
the icons in screen sector 50. These icons are then

10   rendered unmodifiable or frozen. As shown in an enlarged
view of Fig. 4, all icons in circumscribed sector 50 are
unmodifiable. At this point, as shown in Fig. 5, the
user is permitted to select by pointing and clicking with
cursor 53 to an icon 55 which will thereby be rendered

15   "hot" or modifiable. This selected hot icon 55 is shown
in further magnified view of Fig. 6. Then for example,
only this hot icon 55 may be modified by being resized,
enlarged as in Fig. 7 or moved as in Fig. 8.

Another aspect of the invention is illustrated with

20   respect to Fig. 9. In an illustrative section of a
display screen with a high icon density, there are three
different types of icons as indicated by their shapes:
rectangular icons 51, circular icons 62 and pentagonal
icons 61. The pentagonal icons are shaded to indicate

25   that they are the "hot" icons which are unfrozen and may
be modified. The selection shown in Fig. 9 is the result
of an illustrative interactive dialog as shown in Fig.
10. The user has selected the "Freeze Mode ON" state 66
in dialog panel 65 and, thus, been offered a choice of

30   non-freezing one of the icon types 67, 68 or 69. The
user has selected "Do Not Freeze" 64 the pentagonal icons
67, which has resulted in the status shown in Fig. 9
wherein the user is enabled to only modify icons 61.

Now, with reference to Figs. 11 and 12 we will
describe a process implemented by the present invention
in conjunction with the flowcharts of these figures.
Fig. 11 is a flowchart showing the development of a
5   process according to the present invention for the
freezing of the modification of icons in a particular
high icon density sector of a display screen and then
unfreezing selected icons within the frozen sector so
that such icons may be modified. In a personal computer
10   set up with a desktop GUI and an operating system, a
routine is provided for tracking cursor movements between
points on a display screen, step 71. A routine is
provided for tracking cursor and icon positions on the
display screen, step 72. A routine is set up for the
15   user through cursor movement to circumscribe any section
of the display screen containing any cluster icons, step
73. A process is set up wherein the icons circumscribed
in step 73 are frozen, i.e. cannot be modified, step 74.
Then a routine is set up enabling the user to unfreeze
20   any icon in the circumscribed section by pointing to it
with his cursor, step 75, thus making the icon "hot".
The unfrozen or hot icon may then be modified in any
conventional manner without affecting any surrounding or
adjacent frozen icon. All of the frozen icons may then
25   be returned to their original unmodifiable condition,
step 76.

The running of the process will now be described
with respect to Fig. 12. First, step 80, the cursor is
moved in the direction of a target icon that the user
30   wishes to select. A determination is made with respect
to the moving cursor as to whether the target icon is
within a high icon density section of the display screen,
step 82. The process may use any criteria that the user

or process designer may determine for what constitutes a
high icon density section, e.g. icons per unit area of
the screen, space between icons and/or the extent of icon
overlap. A predetermined value for icon density is set

5   up. If Yes, the target icon is within such a high icon
density sector of the display screen, then, step 85, the
user circumscribes the high density are by using his
cursor. The circumscribed icons in the high density area
are frozen, i.e. rendered unmodifiable, step 86; the

10   target icon is pointed to with the cursor, step 87; and
the target icon is, thus, unfrozen, step 88. The
unfrozen target icon is then modified by using any
conventional means, step 89. Upon the completion of the
modification, the circumscribed icons are unfrozen, step

15   90. On the other hand if the decision from decision step
82 had been No, the target icon is not in a high density
section of the screen, the target icon could be
conventionally selected, step 83, and modified, step 84.

       At this point, or after step 90, a determination may

20   conveniently be made as to whether the session is over,
step 91. If Yes, the session is exited. If No, the
process is returned to step 80 where movement of the
cursor toward another target icon is commenced.

       One of the implementations of the present invention

25   is as an application program 40 made up of programming
steps or instructions resident in RAM 14, Fig. 1, during
computer operations. Until required by the computer
system, the program instructions may be stored in another
readable medium, e.g. in disk drive 20 or in a removable

30   memory, such as an optical disk for use in a CD ROM
computer input or in a floppy disk for use in a floppy
disk drive computer input. Further, the program
instructions may be stored in the memory of another

computer prior to use in the system of the present
invention and transmitted over a LAN or a WAN, such as
the Internet, when required by the user of the present
invention. One skilled in the art should appreciate that
5   the processes controlling the present invention are
capable of being distributed in the form of computer
readable media of a variety of forms.

Although certain preferred embodiments have been
shown and described, it will be understood that many
10   changes and modifications may be made therein without
departing from the scope and intent of the appended
claims.